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NEW AND INTERESTING NEOCENE FOSSILS
FROM THE ATLANTIC COASTAL PLAIN

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NEW AND INTERESTING NEOCENE FOSSILS FROM
THE ATLANTIC COASTAL PLAIN

Content: *Introductory remarks — Description of new species —
Changes in specific names — Notes on the correlation of
certain Miocene beds in the James river valley*

INTRODUCTORY REMARKS

During the past summer (1914), six weeks were spent with the cruiser *Ecphora*, under the personal direction of Professor G. D. Harris, in studying the Miocene formations as exposed along Chesapeake bay and in the James and York river valleys, Virginia. As a result of this work, a large amount of Miocene material was collected; and it is from this source and from the material collected on similar expeditions in 1896, 1897 and 1898 that the following species were obtained. These new shells are from the following states, viz., Virginia, North and South Carolina and Florida.

I, moreover, take this occasion to make a few changes in the names of certain Miocene shells which have been found to be pre-occupied. Lastly, I wish to make a few remarks concerning the correlation of certain Miocene beds in the James river valley.

I wish here to thank Professor Harris for the very numerous favors received during my Tertiary work.

*Paleontological Laboratory,
Cornell University,
December 1, 1914*

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DESCRIPTION OF SPECIES

Nassa cornelliana, n. sp.,

Plate 4, Fig. 11

Shell small, heavy, elongate; with three and a half smooth nuclear and four subsequent whorls; suture appressed; the first sculpture to be introduced is a transverse ribbing; this is soon followed by four impressed revolving lines; on the body whorl the transverse sculpture consists of seven or eight large, thick ribs, and these are continued in the same line across the earlier whorls, interrupted at the suture; on the body whorl the transverse ribbing is crossed by about nine impressed revolving lines which on the middle of the whorl are separated by wide bands but become more crowded at the base and next to the suture; on the earlier whorls only four revolving lines are present; the ribbing is made only slightly nodose by the revolving lines and there is no pronounced shoulder to the whorls; canal short, straight, with numerous revolving lines and separated from the rest of the shell by a moderate sinus; mouth subovate in shape, with a small sulcus at the posterior commissure; outer lip thickened and with about seven liræ, which alternate in strength; pillar lip callous, smooth and with a raised border; siphonal fasciole strong.

Height 5, greater diameter 2.5 mm.

This species is characterized by its elongate shape, impressed revolving lines and the strong, transverse ribbing. Its nearest related form appears to be *N. caloosaensis* Dall, but differs from that species in its more elongate form, lack of the shoulder on its whorls and its larger size.

Duplin Miocene(?) ; Currie, N. C.

Lirosoma sulcosa, var. *multicostata*, n. var.,

Plate 5, Fig. 13

Shell of the general shape of *C. sulcosa* Con., but usually smaller, with the anterior canal more produced; body whorl two-thirds the length of the shell: surface of shell strongly sculptur-

ed with 9 to 11 raised revolving ribs, separated by as wide or wider interspaces; on the body of the whorl the ribs become more numerous, also finer on the anterior canal; the suture, bordered by a flattened area which generally carries a single carination; the revolving lines are additionally crossed by wave-like lines which are parallel to the growth lines and cause the carination of the ribs.

Height 20, greater diameter 11 mm. (Specimen figured)

This shell when not full-grown appears perfectly distinct. In its later development the shell does not increase much in height but becomes more globose, like the typical form. It is then distinguished by its more numerous revolving ribs and in having generally the flattened area next to the suture with a carinated line.

Yorktown formation: Kingsmills, Grove Wharf

***Typhis harrisi*, n. sp.,**

Plate 2, Figs. 7, 9

Shell of moderate size; whorls polished; whorls about 5, with 4 large, thick varices, which on the body whorl extend completely across the whorl and onto the anterior canal; between these are shorter varices which continue only to just below the middle of the whorl; the varices carry on the shoulder of the whorls a hollow, recurved spine; these are generally broken off, and represented only by hollow stumps; whorls above the shoulder are irregularly flattened and with the suture appressed; on this area only the smaller varices continue across to the suture; surface of shell smooth with only growth lines which extend up onto the spines; the varix next to the mouth carries about four raised ridges which are placed at right angles to the aperture; on the body whorl resting marks are indicated by raised lines between the varices and representing the aperture and each of the larger varices have on their summit a wavy line formed by raised ridges corresponding to those at the aperture; canal broad and flattened, recurved and ending in a hollow stump which probably represents the base of a recurved spine; aperture round or subovate with a raised rim.

Height 20, diameter 13 mm

This *Typhis* is distinct from the other representatives of the genus in the Tertiary. The species finds its closest related forms in the Oligocene and Pliocene of the Floridian region.

Florida ; Miocene of the upper bed at Alum Bluff.

Pyrula jamesi, n. sp.,

Plate 5, Fig's 14-16

Shell small, globose, moderately heavy; whorls about five in number; the last or body whorl large, inflated and covering a little more than two-thirds of the preceding; spire pointed; surface sculptured with plain raised revolving ribs, separated by broader interspaces; revolving ribs about 22 in number; these are regularly spaced on the body whorl but become smaller and more irregular on the anterior canal; suture bordered by one of these ribs, and separated by a broader interspace than usual; interspaces with fine, raised and closely spaced lines which are parallel to the growth lines; mouth large; canal slightly oblique; columella more or less callous.

Length of type 12, diameter 7.5 mm.

Length of the larger specimen 13.5, diameter 8.5 mm.

From the Maryland Miocene another species of this group was described by Martin as *Pyrula harrisi*. This is a Calvert species and characterized by its shorter spire, and much more numerous finer, revolving ribs.

Yorktown formation; James river at Kingsmill.

Solariella shackelfordensis, n. sp.,

Plate 5, Fig's 5,6

Shell of medium size, pearly; whorls about six in number; nucleus very small; earlier whorls with two carinated ribs, one at the angle, the other about the middle; upper surface of whorl smooth and with oblique wave-like undulations which cause the granulation of the revolving ribs; suture of the later whorls gradually advancing down so that additional revolving ribs and lines are brought to view; on the body whorl a smaller faint revolving line is introduced between the two carinated ribs; in addition there are two plain ribs below the carinated ones, the lowermost being the largest; base of shell with about five revolving, plain ribs; umbilicus deep and bordered by a strongly carinated rib;

interior of umbilicus smooth with a single revolving line and crossed by transverse ribs.

Height of type 10, diameter 10 mm.

A second species of *Solariella* is found commonly at various localities in the Yorktown formation in Virginia and which I have identified with Tuomey and Holmes, *Trochus gemma*. I have figured a specimen from Grove Wharf on Plate 5, fig's 7, 8, 9. Dall in his Tertiary Geology of Florida units with Toumey and Holmes species the recent *Liotia tricarinata* Stearns, under the name of *L. gemma*. *L. tricarinata* is also a Miocene shell. I have specimens from Wilmington, Magnolia, Neuse river, N. C. This last-mentioned species is typically much smaller, generally with a smooth base or at least with only faint revolving lines and lastly with a strong carina bordering the suture. *Solariella shakelfordensis* may be distinguished from *S. gemma* in having only two strongly carinated, ribs more numerous, smaller, plain, revolving lines.

St Mary's formation (?) ; Shakelford, Va.

Teinostoma (*Solariorbis*) *variabilis*, n. sp.,

Plate 5, Fig's 1-4

Shell small, solid, rather depressed, but with a slightly pointed spire ; umbilicated ; whorls 4, enlarging uniformly ; periphery of last whorl, slightly angulated ; suture impressed ; sculpture variable, consisting of simple riblets, crossed by oblique, spiral striæ ; on the earlier whorls, these riblets are most pronounced, becoming gradually obsolete and wave-like on the later ; spiral striæ persistent ; in some cases the riblets may also continue over a larger portion of the later whorls than usual ; base of shell strongly sculptured, the riblets being here persistent ; in old shells a gerontic stage is introduced, coming after a resting stage and this is characterized by an entire lack of sculpture ; aperture rounded or slightly oblique, and with the edge bordering the umbilicus thickened ; umbilicus deep, not bordered by a ridge or carina.

Greater diameter 2, height 1 mm.

This species is characterized by its variability. From *T. un-*

dula Dall and *T. greensboroense* Martin the species may be distinguished by its lack of the carina which occurs on the periphery of those shells. It is probable that H. C. Lea's *Delphinula oblique-striata* belongs in this genus. This last-mentioned species has the radiating ribs divided into 2 or 3 branches near the periphery, with the umbilicus bordered by a slight, carinated line.

Yorktown formation; Yorktown, Va.

***Pecten (Pecten) smithi*, n.sp.,**

Plate 4, Fig's 1, 2

Left valve small, thin, flat with a slight depression at the beak; shape ovate, as high as broad; ribs about 20 to 22 in number, low and separated by flat interspaces, about twice as wide as the ribs; ribs becoming obsolete on the anterior submargin (and probably also on the posterior) and are here replaced by a rather prominent ridge; ribs and interspaces at first crossed by concentric lamellose lines, which also pass over the submargins and on to the ears; these concentric lines are equally spaced and the lamellæ appear to have been originally roof-like, passing from one line to the other; this concentric sculpture is developed for a time and then suddenly ceases, the remainder of the shell having only the ribs; interior of shell smooth, lirate by the ribs.

Height 26, apparent width 29 mm.

The above description is based on two imperfect left valves. Both are from Kingsmill, Virginia. On the smaller shell, the concentric lines cover the entire shell. On the larger this sculpture is lacking from the basal part, having disappeared suddenly at a time when the shell had reached the same size as the smaller shell.

Yorktown formation; Kingsmill, Va.

***Pecten (Nodopecten) vaccamavensis*, n. sp.**

Plate 1, Fig. 1

Shell rather large; valves of moderate but equal convexity; left valve with about seven narrow, elevated ribs which are slightly nodose at more or less equal radial distances from the beak; interspaces very wide and with about 4 or 5 longitudinal lines which are made slightly setose by the equi-distant, elevated, concentric lines; anterior and posterior marginal slopes, abrupt; ears flat, with narrow riblets, slightly imbricated by the concentric

lines which are here rather closely crowded. Left valve (not well preserved in type specimen) with seven or eight very wide ribs, separated by narrow and deep interspaces.

Length 70, width 68, thickness 18 mm.

The specimen above described is from the Cornell University collection and labelled as Miocene of Lake Waccamaw, N. C. When more is known concerning its exact stratigraphic position the species may prove to be Pliocene, as is also the case with *Modiolus gigantoides*. The specimen is not well preserved, being a large cast, with a portion of the shell of the left valve still remaining. Three of the ribs are much more prominent than the other four, but apparently all were introduced at about the same time. These three ribs, together with the rather angular submargins, give the shell a quinquecostate appearance.

Miocene (?) ; Lake Waccamaw, N.C.

***Modiolus pulchellus*, n. sp.,**

Plate 4, Fig's 12-14

Shell small, smooth, convex ; beaks low ; anterior end very short, posterior slope even, not depressed ; posterior end of hinge line evenly rounded into the base ; anterior margin with a slight-impressed zone ; surface smooth, with incremental concentric lines which are occasionally deep and then represent resting stages ; ligamental sulcus deep and narrow, with finely crenulated edges.

Length 9, width 6.5, thickness 3.5 mm.

This species in its general shape recalls *M. silicatus* Dall (as *M. tampaensis*, Pl. 27, fig. 28) of the Upper Oligocene of the siliceous beds at Ballast Point, Florida but is a smaller shell. The posterior extremity in *M. silicatus* according to Dall's figure appears to be slightly depressed and with the anterior margin wide and flat. In the Miocene shells the anterior margin carries a small tooth-like projection. The crenulation of the ligamental sulcus is also a constant character and is well-marked in both valves. Shell generally thin but occasionally quite heavy with deep muscle scars.

Yorktown formation : Kingsmill (type), Grove Wharf.

Modiolus gigantoides, n. sp.,

Plate 2, Fig's 1-3

Shell large, heavy, convex, elongated; beaks placed rather near the anterior end of the shell; anterior end narrow; shell highest just about the middle; posterior end acutely rounded; dorsal margin straight and deflected at an angle of about 30° ; anterior portion with two well-marked depressions extending from the beak to the basal margin, and with a prominent ridge between; surface marked with coarse lines of growth with little or no signs of resting stages; anterior end slightly projecting beyond the beaks, with thickened lamellar margin.

Length 98, height 50, thickness 39 mm.

This species is characterized by its large size, convexity, heavy shell and the lack of the prominent, impressed, dorsal area of *M. ducatelli* Con. From *M. gigas* Wagner to which it is allied most closely, a marked difference is found in its much less expanded posterior end, greater convexity and less pouting anterior end. *M. gigas* has for some time been considered as doubtful because of its rarity and abnormal appearance. Last summer, however, a single, more or less imperfect specimen of a *Modiolus* was collected at Yorktown which agrees in all essential characters with the figure of *M. gigas* except in the matter of size, the specimen measuring 65 mm. in length. This shell possesses the wide, expanded posterior end but lacks the less pouting anterior end.

Miocene(?); *Lake Waccamaw, N. C.*

Lithophaga yorkensis, n. sp.,

Plate 2, Fig's 5, 6, 10

Shell small, thin, in shape more or less like *Lithophaga aristata* Dillwyn but differs in being constantly shorter and in lacking entirely the twisted process which projects from the posterior end of that species; surface smooth, with only very fine growth lines and occasionally incised lines representing resting stages; a ray extending from the posterior end of the shell to the beak along which the resting marks are well developed; five or six discontinuous faint raised lines extend from beak toward basal margin in a posterior direction; shell loosely surrounded

by a calcareous deposit, terminating in siphonal tubes.

Length 14, height 6, thickness 5 mm,

This species is quite different from the other described Miocene *Liothophagus*. *L. subalveatus* Con. has a wide medial furrow and obliquely produced posterior end. *L. ionensis* Glenn is characterized by its broad posterior portion. *L. yorkensis* on the other hand shows relations with the recent *L. aristata* Dillwyn, as indicated above. In the case of the recent shell, the posterior extremity is twisted and attached to the calcareous shell which surrounds it. The Miocene shell is perfectly loose as shown in figure 10, Plate 2. Conrad appears to have had a specimen of this species, as a fair but characteristic figure is given on Plate 3, figure 1 of Kerr's Rept., N. C. Geol. Survey but unaccompanied by either name or description.

Yorktown formation ; Yorktown (type) ; Bellefield, Va.

***Spisula (Hemimactra) harrisi*, n. sp.,**

Plate 1, Figs 5, 6

Shell large, thin, subtrigonal in shape ; beak narrow and pointed, markedly curved anteriorly, over the impressed anterior submargin ; anterior end slightly longer than the posterior, anterior submargin dorsally impressed and flattened, becoming depressed near the basal margin ; posterior dorsal margin impressed and flattened its entire length and with a furrow extending from underneath the beak, and becoming rapidly obsolete and terminating at about one-half of the distance along the dorsal margin measured from the beak ; surface smooth, on the center of the shell disk, very irregular with growth lines along the basal margin ; a fine longitudinal line along the angle bounding the impressed postero-dorsal submargin ; on the dorsal side of this line the growth lines are very coarse, becoming smooth again on the furrow ; hinge agreeing with that of *S. curticens* Dall, but slightly less heavy.

Height 105, width 122, thickness 42 mm.

This species is closely related to *S. curticens* Dall. Comparison with Dall's type in the National Museum however shows that the species is distinct. These differences may be noted. *S. harrisi* is slightly less heavy, the dorsal submargins are more

impressed and flattened; beaks more inclined anteriorly and with the furrow extending further underneath the beak on the anterior and posterior submargins; umbo narrower with more pointed beaks. The anterior dorsal submargin of *S. curticens* appears from the fragmentary type to have been more depressed.

Dulpin formation; Peedee river?, S. C.

***Ensis schmidtii*, n. sp.,**

Plate 3, Fig's 1-3

Shell large, thin, elongated but fairly wide, gaping at both ends; dorsal margin straight, but with the beaks curved upward; basal margin of shell evenly rounded; posterior extremity rounded or truncated; anterior extremity obliquely truncated with a low furrow extending from the beak, parallel to side; surface smooth, polished, growth lines most strongly developed on the posterior portion of the shell; there is a faint indication of two or three rays extending from the beak to the posterior portion of the basal margin; left valve with three teeth, right valve with two teeth; anterior muscle scar very elongated.

Length (type) 94, height 28, thickness 12 mm.

This species is very different from any of the other Miocene *Enses*. From these it is distinguished by its relative shortness, height, and large size. At the type locality the species occurs in a yellow sand and is not uncommon.

Yorktown formation; Jack's Bluff on the Nansemond river, Va. Also at Suffolk, Va., at the Standard Oil tanks.

***Semele nelliana*, n. sp.,**

Plate 3, Fig's 5,6

Shell large, thin, inequilateral, moderately inflated; the anterior end longer than the posterior; beak small and pointed, slightly rounded or obscurely truncated; basal margin obliquely rounded; posterior dorsal slope slightly impressed; lunule of left valve very small; sculpture of two kinds, a radial and a concentric; radial sculpture very distinct, of threadlets, rather low, wide (on the middle of the shell disk of an average width of .75 mm).

and these are separated from each other by impressed lines ; these radial threadlets become much narrower on the anterior submargin, obsolete on the posterior dorsal slope ; concentric sculpture of evenly spaced, distant, high lamellæ, becoming lower and more closely spaced on the umbo ; on the posterior dorsal slope the lamellæ are more crowded, wavy and irregular in direction, but show little or no compression ; the radial threadlets are continued on the lamellæ and end just below the top ; the lamellæ are therefore not crenulated.

Length 56, height 44, depth of valve 9 mm.

This fine shell belongs to the group of *Semeles* represented in the Oligocene by *S. chipolana* Dall and *perlamelloides* Maury and in the Pliocene by *S. leana* Dall and *S. perlamellosa* Heilprin. The only species with which comparison is necessary, is *S. leana*, which has much the same contour. In the Miocene shell here described, the concentric lamellæ are much less numerous, higher, and more distantly spaced, the radial threadlets coarser, and these do not crenulate the concentric lamellæ. The posterior extremity of *S. leana* is markedly truncated and with the posterior dorsal slope strongly depressed ; and here the concentric lamellæ are low, crowded and flattened. *S. perlamellosa* on the other hand, is more nearly equilateral, more elongated and with the sculpture much like *S. leana*.

Duplin formation ; Peedee river ? S. C.

Petricola (*Claudiconcha*) *grinnelli*, n. sp.

Plate 4, Fig's 7-10

Shell elongated, solid, often distorted ; anterior end rounded ; posterior end elongated, pointed ; right valve slightly larger and overlapping the left, especially on the posterior, dorsal margin ; surface sculpture of irregular, radial striæ, which as a rule, are slightly larger and separated by wider interspaces on the anterior portion of the shell ; striæ more or less granulated by concentric lines ; hinge weak, with slender teeth, those in the specimens broken off, but, judging from the stumps remaining, consisting of three cardinal teeth in each valve.

Type specimen : Length 22, height 13, thickness 12 mm.

A large valve : Length 25, height 16, thickness 7 mm.

The subgenus *Claudiconcha* Fischer as exemplified by *P. mon-*

strosa Gmelin contains shells which have the right valve slightly larger and overlapping on the left. This species probably burrowed in the sand. The Miocene shell compares well with the type form of this subgenus but possesses a much more degenerate hinge.

Yorktown formation, James river, 5 miles north of Smithfield; Bellefield.

***Erycina regifica*, n. sp.,**

Plate 4, Fig's 3-6

Shell small, thin, moderately convex, very inequilateral; anterior end much longer and with the beaks situated near the posterior end; posterior extremity well-rounded, the anterior more pointed; surface sculptured with obsolete concentric lines, which occasionally are wave-like on the middle of the shell surface, in addition a peculiar hair-like, radial sculpture is present and quite pronounced over the greater portion of the shell surface, but lacking from the umbones; umbones smooth and polished; hinge strong, with a single, small, cardinal tooth and two lateral laminae in each valve; interior smooth, with the muscular scar well marked and with obscure radial rays.

Length 7.5, height 5.25, thickness 2.5 mm.

This species is readily distinguished by the peculiar, sharp, hair-like, radial striae. In shape the species recalls *E. carolinensis* Dall, but is much more inequilateral. Its hinge is well developed, with the cardinal and lateral lamellae rather close together, and in this feature suggestive of *Lepton*.

Duplin Miocene of South Carolina, Peedee river ?

***Bornia virginiana*, n. sp.,**

Plate 2, Fig's 4, 8

Shell oblong, thin, convex, inequilateral; beak with the prodissoconch evident, slightly recurved; hinge normal, with the lamellae of the right valve slightly shorter; surface polished, with regular, impressed, concentric lines and with occasionally more distant ones representing resting stages; a slight, broad furrow extends from the beak to the basal margin; anterior and posterior ends with 3 or 5 radial plications which crenulate the basal margin; basal margin with a flat broad ribbon.

Height 5.5, width 7.5, thickness 2.75 mm.

This species bears much resemblance to the common Miocene *B. mactroides*. Its most distinguishing characteristic is the radial plication. These plications are strong in full-grown shells but in immature shells show only as broad crenulations of the basal margin. *B. virginiana* is more elongated, more convex and with a less polished surface.

Yorktown formation ; Grove Wharf, Kingsmill, James river near Smithfield.

Rochefortia (**Pythinella**) **flicaticola** n. sp.,

Plate 5, Fig's 10-12

Shell small, elongated and with the anterior end much produced and one and a half times again as long as the posterior ; antero-dorsal margin straight with the extremity evenly rounded ; postero-dorsal margin curved behind the beak, becoming straight posteriorly and terminating in the well-rounded posterior extremity ; basal margin with a moderately deep insinuation pointing towards the beak ; surface of shell with fine concentric growth lines and with a few resting marks ; right valve with two prominent thickened teeth, separated by a deep notch ; in the left valve the notch is wider bordered by rather thin laminæ formed by a slight thickening and beveling of the valve margin.

Length 3.00, height 1.75 mm.

The type specimen together with several specimens of the same species were all found inside of a gasteropod shell belonging to *Latiurus flicatus* Con. All the specimens had both valves intact so that together with their peculiar shape, a commensal or parasitic habit on the above mentioned gasteropod may be taken for granted. In its hinge structure and shape, this species agrees well with the recent *Rochefortia cuneata* Verrill and Bush which is used by Dall as typifying the subgenus *Pythinella*. The Miocene shells appear to differ from its recent representative, in having its anterior end less elongated, anterior extremity more evenly rounded and lastly in having the basal insinuation of its valves much more pronounced.

Yorktown formation, James river, 5 miles north of Smithfield, Va.

***Chione dalli* n.sp.,**

Plate 3, Fig's 7-9

Shell ovate to triangular, slightly convex, very solid ; beaks prominent, approximate, sub-acute ; lunule lanceolate, defined by an impressed line, smooth or with lines of growth ; escutcheon long and narrow, smooth ; surface of shell with thick, flattened, concentric lamellæ, fairly regularly arranged on the umbo, later becoming irregular and coalescing towards the basal margin ; no radial sculpture present ; hinge fairly heavy, with three cardinal teeth in each valve ; pallial sinus merely a small notch ; margin minutely crenulated.

Type. Length 23, height 20, thickness 6 mm.

Larger shell. Length 25, height 21, thickness 6 mm.

On page 1290 Dall, in his Tertiary Geology of Florida, vol. 3, pt. 6, briefly describes without naming a *Chione* from Petersburg Virginia which appears to belong to this species. This species bears some resemblance to *C. cortinaria* Wagner but may be distinguished by its irregular concentric lamellæ and the entire absence of the radial sculpture. At Claremont wharf the species occurs in blue clays of the St Mary's formation, accompanied by several unusual species. *Arca virginia* Wagner is very common here, and a small triangular *Glycymeris* like *Pectunculus virginia* Wagner showing relationship with *G. subovata* Say, of which it is probably a mutation.

St Mary's formation ; James river at Claremont wharf, Va.

***Phacoides (Pseudomiltha) wongi*, n.sp.,**

Plate 1, Fig. 2

Shell orbicular, thin, inflated, inequilateral ; beaks small and slightly prosogyrate ; lunule very deep and oval, extending underneath the beak ; anterior extremity rounded, posterior extremity only slightly rounded, and in the young shell verging on truncation ; dorsal margin straight, slightly angulated at the end ; posterior dorsal slope slightly impressed, anterior dorsal portion somewhat wing-like and separated from the rest of the shell surface by irregular marks of compression ; basal margin widely rounded ; surface with irregular concentric wrinkles, which on the posterior dorsal slope are more evenly spaced ; in addition,

finer incremental lines occur, and fine, radial, vermicular striae interior of shell roughened, and with a long, lucinoid anterior, muscle scar.

Height 27, width 32, thickness 7 mm.

This species resembles *P. foremani* Con. of the Calvert formation of Maryland. The shell differs in being less rotund, more inflated, thinner and with the posterior dorsal slope much less impressed. The anterior extremity is likewise much more wing-like, with the lunule deep but short, which, in *P. foremani* is typically more elongated. Young shells of both *P. foremani* and *P. anodonta* with rather thin shells usually show a strong development of radial lines or rays in the interior; and the umbonal cavity is generally filled with a deposit of prismatic shell substance. The interior of the shell shows no development of these rays.

Florida; Miocene, Upper bed at Alum bluff

Venericardia (Pleuromeris) scituloides, n. sp.,

Pate 1, Fig's 1-3

Shell small, solid; equilateral, convex triangular in shape; sculpture of 7-9 flat, broad ribs separated by narrow interspaces; umbones with the ribs coarsely or evenly granulated or sometimes smooth; on the basal portion, the ribs are crossed by coarse concentric lines; lunule smooth, very deep, elongated and of a length roughly one-half the height of the shell; escutcheon smooth, lanceolate; hinge rather high and heavy; internal margin fluted by the exterior ribs.

Height 5.50, width 4.75, thickness 5.50 mm.

This species bears much resemblance to *V. scitula* Dall of the Oligocene of the Oak Grove sands Florida. The most marked differences are the fewer ribs, those of *V. scitula* ranging from 12 to 14 in number and in having these ribs separated by narrower interspaces. From *V. tridentata* Conrad, the species is distinguished by its fewer ribs and by its shape.

Florida; Miocene of the upper bed at Alum Bluff.

Glottidia inexpectans, n. sp.,

Plate 5, Fig's 17-21

Shell linguloid ; elongated with the anterior extremity truncated ; beaks obtuse and rounded at first, later becoming acute ; lime depositing regularly throughout ; surface polished, with distant marks of resting stages parallel to growth lines ; other growth lines indistinct ; sides of young shell nearly parallel or slightly wider in the middle ; no punctate structure visible with high power ; cardinal area in young shells distinct but small, grooved, not seen in older shells on account of their fragmentary nature ; ventral valve with two nearly straight laminæ, which diverge at a small angle ; dorsal valve with a straight medial septum which does not quite reach to the posterior valve margin ; no muscle scar visible in the adult shells ; valve of young shell with the umbonal scar represented by a single, slight depression just in front of the beak ; laterals by two scars separated by a short medial septum, and just in front of the umbonal scar ; color of shell, which appears to be original, cream-white, yellowish brown or blackish.

Length 7.0, width 4.5 mm. (vent. valve, fragment)

Length 4.5, width 5.5 mm. (dorsal valve)

Length 10, width 5.5 mm. (large fragment)

The occurrence of this brachiopod in the Miocene is of more than usual interest as seeming to represent the sole example of the genus *Glottidia* in a fossil state. The above description is based on fragments of several adult individuals and upon a score or more young shells, generally under 5 mm. in length. The young shells were all found together in the sand contained in the closed valves of a large specimen of *Pecten jeffersonius*. They were accompanied by *Modiolus pulchellus*, *Diplodonta yorkensis* and sea-urchin spines, probably belonging to *Echinocardium orthonotum*. This species is very distinct from the common Atlantic *Glottidia audebarti* Broderip (*G. pyramidata* Stm.) and shows much closer relationship with the Pacific *G. albida* Hinds. From *G. audebarti* the Miocene shell differs in having the lime secreted evenly through the shell, and in having the laminæ of the ventral valve nearly straight and diverging at but a small angle. *G. albida* of the Pacific has more pointed beaks and a more ventricose shell, due to the three elevated ridges which radiate from the beaks.

Yorktown formation ; Kingsmill on the James river

CHANGE IN SPECIFIC NAMES

In the course of this work the following Miocene shells have been found to be preoccupied and for these, new names are here proposed.

Scala reticulata Martin, 1904, Md. Geol. Survey., p. 214, pl. 53, fig. 5, here changed to *Scala martiniana* new name; preoccupied by *Turbo reticulata* Solander 1766, Brander's Foss. Hant., p. 17, pl. 1, fig. 27 and referred by Newton 1891 (British Oligocene and Eocene Mollusca, p. 213.), to the genus *Scala*.

Calliostoma armillatum Tuomey-Holmes, 1856, Pleiocene Fossils of South Carolina., p. 118, pl. 26, fig. 3; described as *Trochus armillatus*. Here changed to *Calliostoma tuomeyi* new name, preoccupied by *Trochus armillatus* Wood, 1828, Supplement to Index Testacologicus, Kiener figures in his Icon., vol. 10, pl. 17, fig. 2, a *Calliostoma*, as *Trochus armillatus* Wood.

Drillia distans Conrad, 1862, Proc. Acad. Nat. Sci. Phila., vol. 14, p. 285., preoccupied by *Drillia? distans* Conrad, 1860, Jour. Acad. Nat. Sci. Phila., vol. 4, 2nd series. p. 258, pl. 46, fig. 49, a Cretaceous fossil. I propose for the Miocene shell, *Drillia conradiana*, new name.

NOTES ON THE CORRELATION OF CERTAIN MIOCENE BEDS EXPOSED IN THE JAMES RIVER VALLEY

Finally, I wish to present a few notes on the correlation of certain Miocene beds exposed in the James river valley. The observations upon which these conclusions are based were made this past summer while on the Cornell Geological expedition conducted by Professor G. D. Harris.

The geology of the Coastal Plain of Virginia is well treated by Professor W. B. Clark and B. L. Miller in their report on The Physiography and Geology of the Coastal Plain Province of Virginia, and published as Bulletin 4 of the Virginia Geological survey. In this report three formational units are recognized in the Miocene series, namely the Calvert, St Mary's and the York-

town, the Choptank being considered as absent. These formations occur as broad concentric bands, the innermost naturally the oldest. At Petersburg the Miocene rests on crystallines, and on Eocene near City Point and elsewhere.

In the James river valley then, commencing at the mouth, the yellow fossiliferous sands first met with, are considered as belonging to the Yorktown formation. Below these yellow sands are blue clay marls which are divided by Clark and Miller into the Calvert and St Mary's formations. It is with these blue clay marls that I wish to deal. Hence for matter of discussion, the Miocene in this valley may be divided into the lower blue clays and the yellow sands of the Yorktown formation.

A fact which early impresses itself upon a worker in this valley is the great paleontological similarity which the different beds present. The fauna of the blue clays, although different in details from that of the Yorktown sands, still shows close relations. A still greater difficulty is encountered, if a further division is attempted. In the report above referred to, the Miocene beds at Petersburg, on Coggin's point and in the vicinity of City Point, are placed in the Calvert formation, but I will attempt to show, there is no paleontologic reason which warrants such correlation.

The fauna of the Calvert formation is rich in species which are distinctive, such as *Ostrea percrassa*, *Pecten humphreysi*, *Plicatula densata*, *Corbula elevata*, *Cytherea staminea*, and others, together with a host of gasteropods, of which we may mention, *Turritella indenta**, *Fossarus dalli* and *Ecphora trisulcata*. In addition, we may include species which commence in the Calvert and extend up into the Choptank, but not into the St Mary's. Representatives of this class are *Pecten marylandicus*†, *Panopea whitfieldi* *Calliostoma aphelium*. It is to be noted that none of these shells occur in the so-called Calvert beds in this valley.

Rather complete collections were made at Petersburg, Coggin's point and at Evergreen because of the interest of their con-

**Turritella bipertita* was described by Conrad from Petersburg. This shell is often considered as a variety of *T. indenta*. However, these shells are not exactly conspecific and hence not available for correlation.

†*Pecten tenuis* H. C. Lea, described from Petersburg is united by Dall with *P. marylandicus*. I have seen the type in the National Museum and consider it the left valve of *P. virginianus* Conrad. Vaughan has recorded *P. marylandicus* and *Calliostoma aphelium* from the Mark's Head marl, Ga., which he refers to the Calvert.

tained faunas. These collections have not as yet been exhaustively studied, but enough is known so that the following general conclusions may be drawn. On Tinsbury creek, near Petersburg, blue, fossiliferous marl is exposed, containing an abundant fauna together with a large quantity of quartz pebbles, derived from the underlying crystalline rocks. From this locality about 75 species have been determined, of which between 13 and 14 per cent. are represented by living forms. On Lieutenant's run, near Petersburg, the same quartz bearing marls are exposed showing more or less the same paleontological characteristics. On Coggin's point Miocene occurs on Ruffin's branch, where they are seen to overlie Eocene beds. The fauna differs little from that of Petersburg, but contains in addition *Pecten dintonius*, *P. virginianus*, *P. decemnarius* and *Cardium virginianum*. At Evergreen, Miocene beds are again met with of the same general type. Here *Melina* (*Perna*) *maxillata* is common with an occasional *P. virginianus* or *decemnarius*. The beds here also overlie Eocene beds.

Not a single species characteristic of the Calvert or Choptank formation has been found in the above beds. On the other hand, the majority of the species occur also in the Yorktown or Duplin formation. Species which illustrate this point may be mentioned: *Ostrea disparilis*, *O. sculpturata*, *Chama corticosa*, *Mulinia congesta*, *Astarte concentrica*, *Arca scalaris*, *Pecten eborus* and others,

The above points are therefore irreconcilable with the correlation of these beds with the Calvert formation. The basis of percentage of the recent species; the paleontologic similarity to the overlying beds of the Yorktown formation; and their stratigraphic position: all point in favor of considering these beds as belonging to the St Mary's formation. With the St Mary's formation as exposed at its typical section, these beds agree in their lithological and general paleontological characters. On the whole however, they appear to me to belong to a slightly younger stage than that at the type section. Few of the species are entirely confined to this formation in this region. But we may mention here *Astarte arata*, *Arca virginiae*, and *Chione dalli*. *Melina* (*Perna*) *maxillata* is generally common throughout and is lacking from the Yorktown. *Pecten virginianus* and *decemnarius* are almost exclusively confined to it, but an occasional specimen is found in the Yorktown.

PLATE I (8)

PLATE I (8)

		Page
Fig. 1.	<i>Pecten (Nodipecten) vaccamavensis</i> , n. sp..... Type specimen showing a portion of the right valve, nat. size.	11 49
2.	<i>Phacoides (Pseudomillha) wongi</i> , n. sp..... Right valve of type, about twice natural size.	19 57
3.	<i>Venericardia (Pleuromeris) scituloides</i> , n. sp..... Right valve, enlarged about twice.	20 58
4.	Left valve of another specimen.	
5.	<i>Spisula (Hemimactra) harrisi</i> , n. sp..... Interior of right valve, $\frac{3}{4}$ nat. size.	14 52
6.	Exterior view of the same valve.	

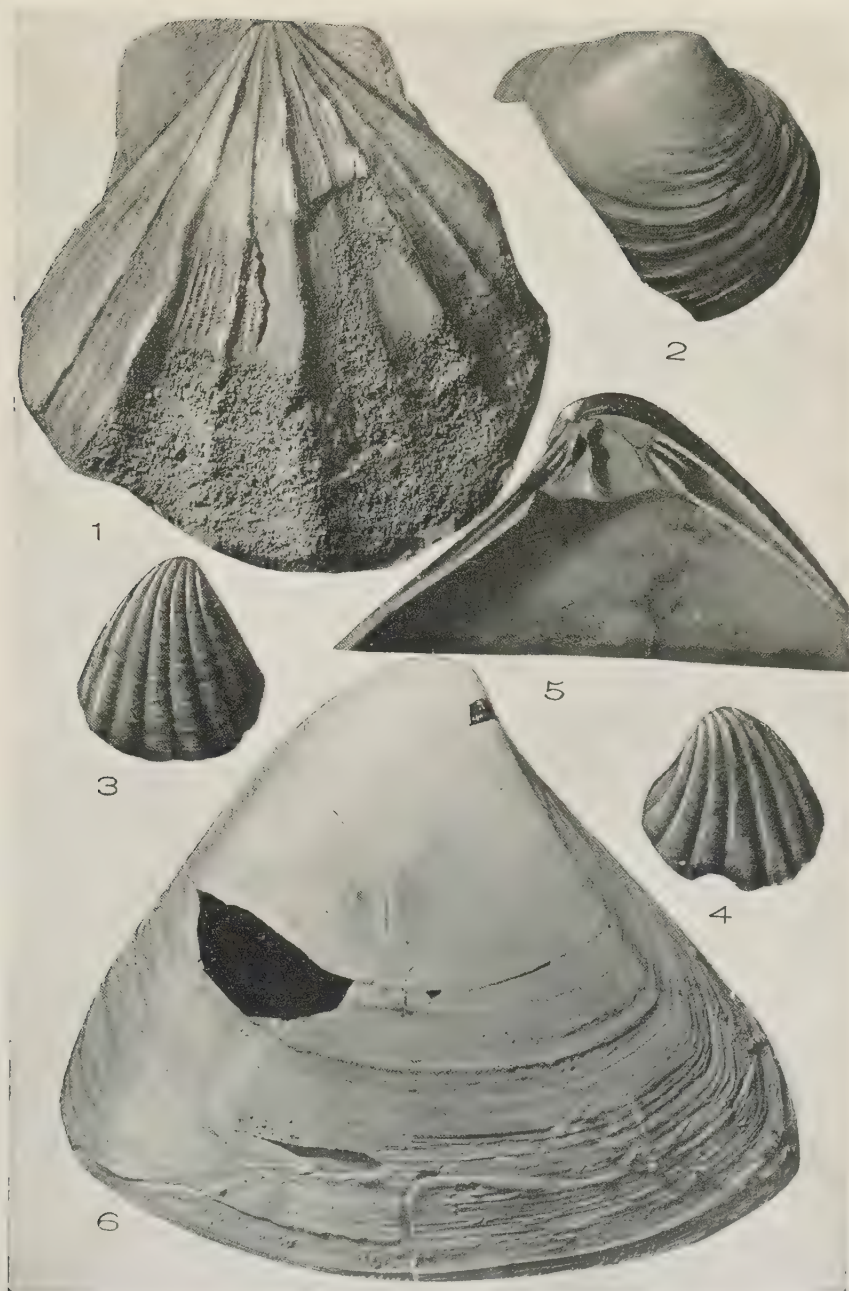


PLATE 2 (9)

PLATE 2 (9)

	Page
Fig. 1. <i>Modiolus gigantoides</i> , n. sp.....	13 51
View showing left valve of type specimen, nearly nat. size.	
2. Ventral view of same specimen.	
3. A fragmentary specimen showing characters of the dorsal area.	
4. <i>Bornia virginiana</i> , n. sp.....	17 55
Exterior view of right valve, enlarged about 4 times, type.	
5. <i>Lithophaga yorkensis</i> , n. sp.....	13 51
Right valve of type, enlarged about twice.	
6. Left valve of type specimen.	
7. <i>Typhis harrisi</i> , n. sp.....	8 46
Ventral view of type, enlarged about 1½ times.	
8. <i>Bornia virginiana</i> , n. sp.....	17 55
Inside view of type specimen.	
9. <i>Typhis harrisi</i> , n. sp.....	8 46
Dorsal view of type specimen.	
10. <i>Lithophaga yorkensis</i> , n. sp.....	13 51
Co-type, showing a portion of the calcareous deposit surrounding the shell.	

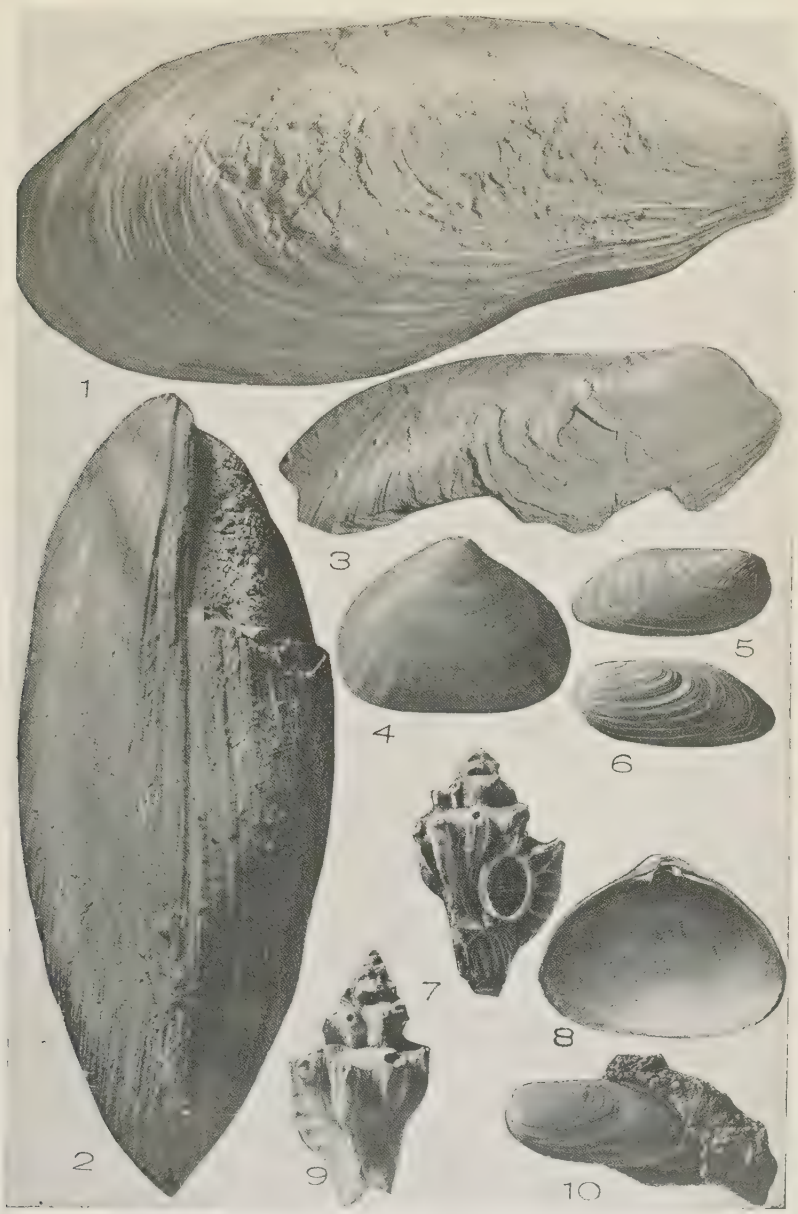


PLATE 3 (10)

PLATE 3 (10)

	Page
Fig. 1. <i>Ensis schmidtii</i> , n. sp.....	15 53
Exterior of right valve of type, nat. size.	
2. Exterior of left valve of type.	
3. Inside view of right valve of a fragmentary specimen of the above species.	
4. Inside view of a left valve of same species.	
5. <i>Semele nelliana</i> , n. sp.....	15 53
Exterior view of left valve of type, nat. size.	
6. Interior view of same specimen.	
7. <i>Chione dalli</i> , n. sp.....	19 57
Exterior of left valve of type, slightly enlarged.	
8. Right valve of another specimen of same species, exterior view.	
9. Left valve of third specimen of the above species.	

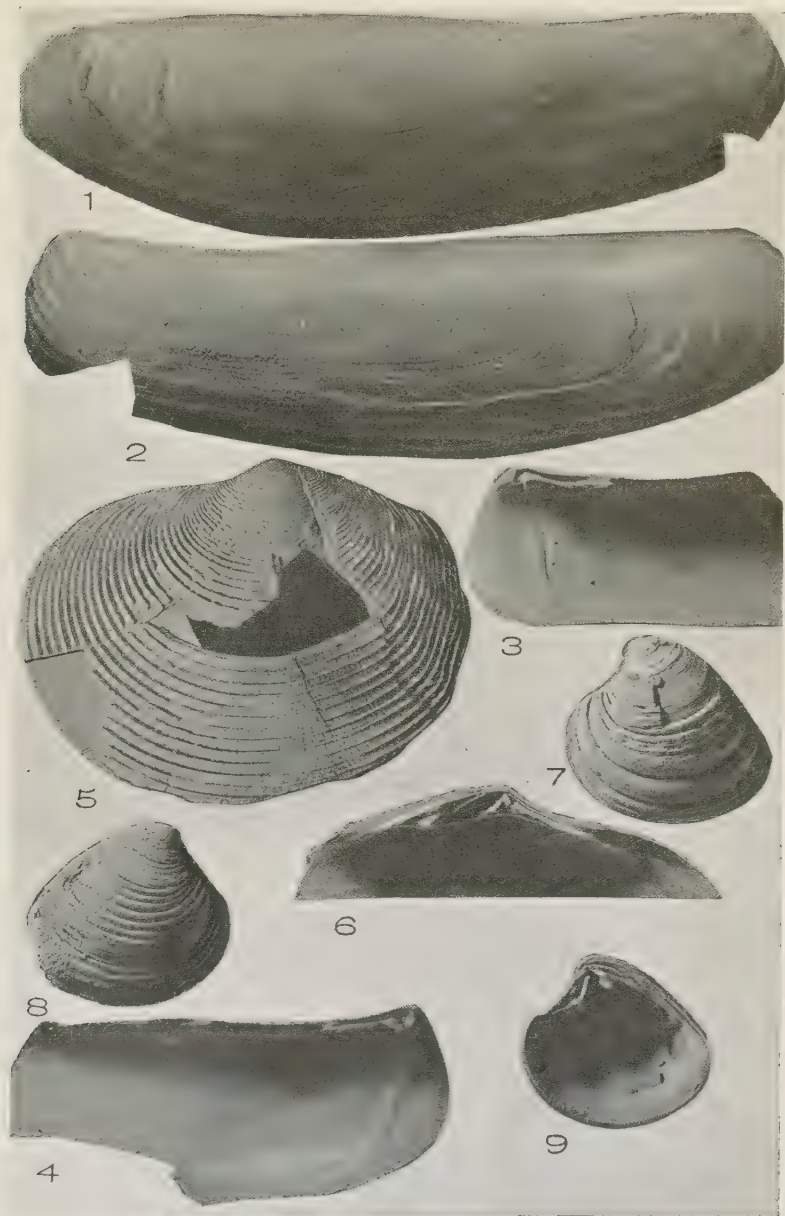


PLATE 4 (IX)

PLATE 4 (II)

	Page
Fig. 1. <i>Pecten</i> (<i>Pecten</i>) <i>smithi</i> , n. sp.....	II 49
Left valve enlarged about twice, type.	
2. A smaller specimen of the same.	
3. <i>Erycina regifica</i> , n. sp.....	17 55
Exterior of right valve of type, enlarged about 3 times.	
4. Exterior view of left valve of same.	
5. Interior view of right valve of type.	
6. Interior view of left valve of type.	
7. <i>Petricola</i> (<i>Claudiconcha</i>) <i>grinnelli</i> , n. sp.....	16 54
Exterior view of left valve of type, enlarged about 1½ times.	
8. Interior view of same specimen.	
9. Exterior view of right valve of type.	
10. Interior view of same specimen.	
11. <i>Nassa cornelliana</i> , n. sp.....	7 45
Ventral view of type, enlarged about 5 times.	
12. <i>Modiolus pulchellus</i> , n. sp.....	12 50
Exterior view of right valve, enlarged about 3 times.	
13. A smaller left valve.	
14. A right valve of another specimen.	

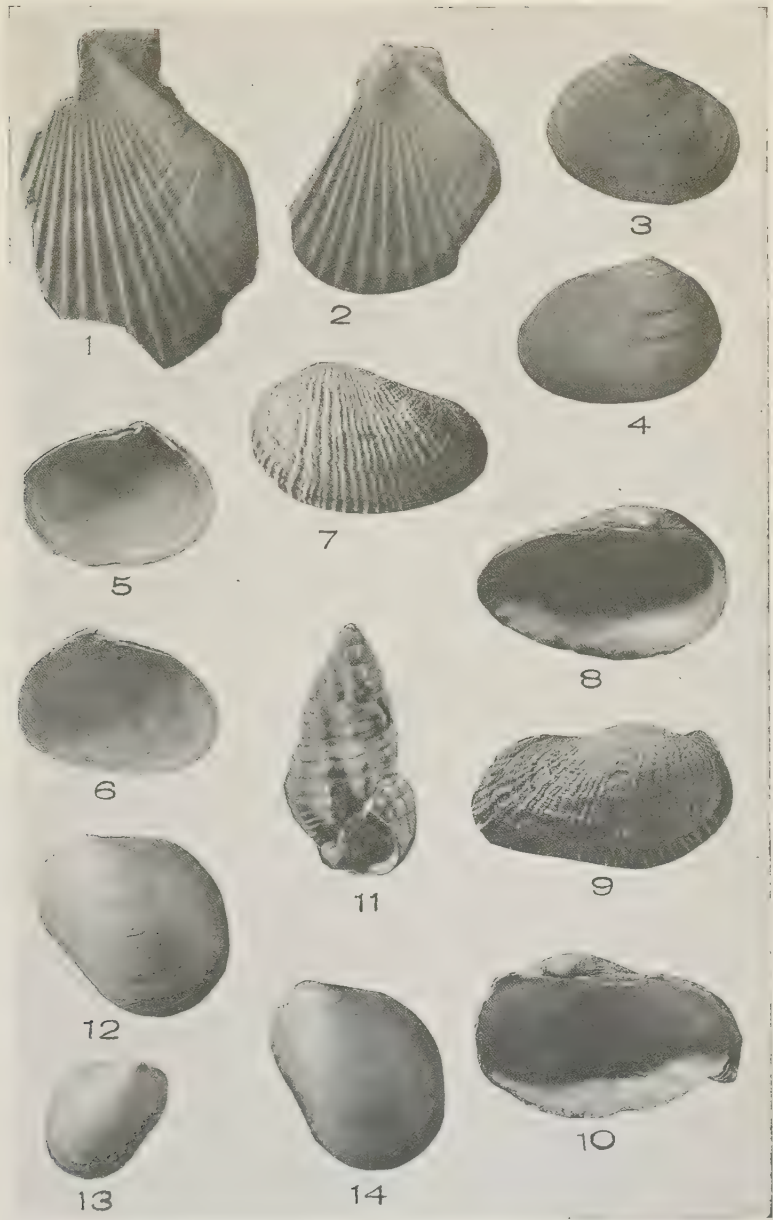


PLATE 5 (12)

PLATE 5 (12)

	Page
Fig. 1. <i>Teinostoma (Solariorbis) variabilis</i> , n. sp.....	10 48
Upper view of type specimen, enlarged about 10 times.	
2. Profile view of a specimen of the same species.	
3. Upper view of a gerontic shell showing the smooth later whorl.	
4. A smaller specimen with the ribs and striae persistent.	
5. <i>Solariella shackelfordensis</i> , n. sp.....	9 47
Ventral view of type, enlarged about twice.	
6. Under view of same specimen.	
7. <i>Solariella gemma</i> , Tuomey and Holmes.....	10 48
Ventral view of a specimen from Grove Wharf, Va.	
8. Under view of same specimen.	
9. Same specimen enlarged 3 times to show sculpture.	
10. <i>Rocheportia (Pythinella) filicicola</i> , n. sp.....	18 56
Interior view of left valve of type, enlarged about 8 times.	
11. Interior view of left valve of type.	
12. Exterior view of right valve of type.	
13. <i>Lirosoma sulcosa, multicostata</i> , n. var.....	7 45
Dorsal view of a specimen, enlarged about twice.	
14. <i>Pyrula jamesi</i> , n. sp.....	9 47
Dorsal view of type, enlarged about 2½ times.	
15. Ventral view of same specimen.	
16. Dorsal view of a larger specimen.	
17. <i>Glottidia inexpectans</i> , n. sp.....	21 59
Interior of dorsal valve, about twice natural size.	
18. Interior of ventral valve.	
19. Interior of young shell, enlarged about 4 times.	
20. Exterior of a still younger shell.	
21. Basal fragment of a large specimen, twice enlarged.	

